# The genus *Paratrichocladius* Santos Abreu (Diptera: Chironomidae) with a newly recorded species from China

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**Abstract**: A catalogue of *Paratrichocladius* in China is provided along with a key to the males of *Paratrichocladius* from China. A newly recorded species *Paratrichocladius yakukeleus* Sasa *et* Suzuki from Oriental China is described and the male is illustrated.

**Key words**: Nematocera; Culicoidea; taxonomy; Catalogue; key

**中国拟三突摇蚊属及一新纪录种（双翅目：摇蚊科）**

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**摘要**：编制了中国拟三突摇蚊属的名录和成虫的分种检索表，记述了采自中国东洋区的拟三突摇蚊属 1 中国新纪录种——屋久岛拟三突摇蚊 *Paratrichocladius yakukeleus* Sasa et Suzuki 的成虫；并提供了该新纪录种成虫的特征图。

**关键词**：长角亚目；蚊总科；分类；名录；检索表

## Introduction

Santos Abreu (1918) established the orthoclad genus *Paratrichocladius* with *Orthocladius tenuipes* Becker, 1908 ( = *Chironomus rufiventris* Meigen, 1830) as type species. According to morphological research of the males, the imagines of genus *Paratrichocladius* are very similar to some species in the genus *Cricotopus*, while the immatures play an important role in distinguishing them. In addition, the inferior volsella often shows large variation within the same species even the specimens are collected at the same locality, as in *P. rufiventris* (Meigen, 1830) (Fig. 1) (Fu *et al*. 2012). The main objective characters separating the imagines to species within this genus include not only the hypopygium but also the number of erect dorsocentrals, the shape of the humeral pit, the number of sensilla chaetica on the legs, and the distribution of setae on the tergite.

So far, 34 species have been described from all zoogeographic regions (Ashe & O’Connor 2012; Fu & Wang 2008; Fu *et al*. 2012; Wang 2000; Wang & Zheng 1990; Yamamoto 2004).

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Accepted 11 June 2014. Published 25 June 2015. Online published 21 May 2015.

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Before the present study, Fu *et al.* (2012) examined the material from the Sino-Indian Region, including 15 Chinese species. This study summarized the 17 species recorded in China which were listed in the catalogue. Based on the distribution of adult males in China, *Paratrichocladius* species have been recorded in 17 provinces of China, including 9 provinces of Palaearctic China and 8 provinces of Oriental China.

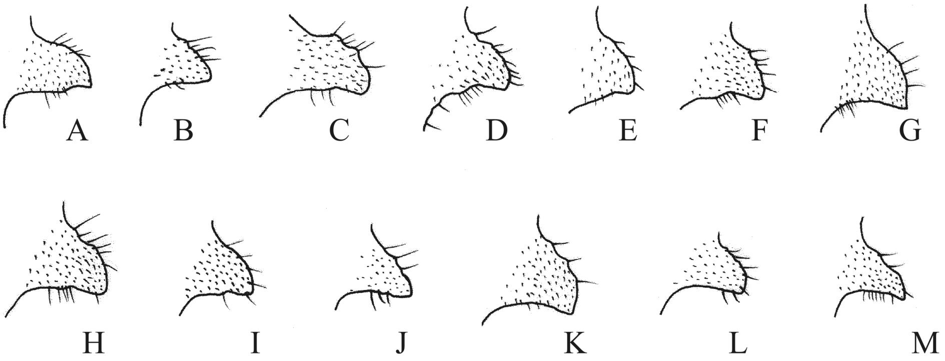

Figure 1. The variation in the inferior volsella of *P. rufiventris* (Meigen 1830) (From Fu *et al.* 2012)

## Material and methods

Morphological nomenclature follows Sæther (1980) with additions and corrections given by Sæther (1990). Material examined was mounted on slides following the procedure outlined by Sæther (1969). Measurements are given as ranges, followed by the mean when two or more specimens were measured. Material examined in this paper is deposited in College of Biological Science and Technology, Hubei Minzu University, China (HBMY).

## Taxonomy

### *Paratrichocladius* Santos Abreu

*Paratrichocladius* Santos Abreu, 1918: 204 (as subgenus of *Orthocladius* Wulp, 1874).

A catalogue of *Paratrichocladius* in China

1. *Paratrichocladius aduncus* Fu *et al.*, 2012

*Paratrichocladius aduncus* Fu *et al.*, 2012: 454.

Distribution. Palaearctic China (Hebei, Ningxia Autonomous Region); Oriental China (Sichuan, Fujian).

2. *Paratrichocladius ater* Wang & Zheng, 1990

*Paratrichocladius ater* Wang & Zheng, 1990: 243; Wang, 2000: 638; Fu *et al.*, 2012: 456.

Distribution. Palaearctic China (Ningxia Autonomous Region, Jilin, Liaoning, Hebei, Henan, Shandong, Gansu); Oriental China (Shaanxi (Baoji City), Yunnan, Sichuan).

3. *Paratrichocladius bicinctus* Fu *et al.*, 2012

*Paratrichocladius bicinctus* Fu *et al.*, 2012: 457.

Distribution. Palaearctic China (Shandong); Oriental China (Sichuan, Hainan, Guangxi Autonomous Region).

4. *Paratrichocladius caestus* Fu *et al*., 2012

*Paratrichocladius caestus* Fu *et al*., 2012: 460.

Distribution. Oriental China (Yunnan).

5. *Paratrichocladius comptus* Fu *et al*., 2012

*Paratrichocladius comptus* Fu *et al.*, 2012: 461.

Distribution. Palaearctic China (Xinjiang Autonomous Region).

6. *Paratrichocladius hamatus* Wang & Zheng, 1990

*Paratrichocladius hamatus* Wang & Zheng, 1990: 243; Wang, 2000: 638; Fu *et al*., 2012: 464.

Distribution. Palaearctic China (Shandong, Hebei, Ningxia Autonomous Region); Oriental China (Sichuan, Yunnan).

7. *Paratrichocladius guidalii* Rossaro, 1990

*Paratrichocladius guidalii* Rossaro, 1990: 61; Fang *et al*., 2012: 955; Fu *et al*., 2012: 463.

Distribution. Oriental China (Tibet Autonomous Region, Sichuan).

8. *Paratrichocladius lanzavecchiai* Rossaro, 1990

*Paratrichocladius lanzavecchiai* Rossaro, 1990: 60; Fu *et al*., 2012: 464.

Distribution. Palaearctic China (Hebei).

9. *Paratrichocladius pierfrancescoi* Rossaro, 1990

*Paratrichocladius pierfrancescoi* Rossaro, 1990: 60; Fu *et al*., 2012: 466.

Distribution. Palaearctic China (Xinjiang Autonomous Region, Shandong).

10. *Paratrichocladius pretorianus* (Freeman), 1956

*Trichocladius pretorianus* Freeman, 1956: 316.

*Paratrichocladius pretorianus* (Freeman), Freeman & Cranston, 1980; Rossaro, 1990: 59; Harrison, 1992: 184; Fu *et al*., 2012: 466.

Distribution. Oriental China (Fujian).

11. *Paratrichocladius rufiventris* (Meigen, 1830)

*Chironomus rufiventris* Meigen, 1830: 249.

*Chironomus opplens* Walker, 1856: 187.

*Orthocladius tenuipes* Becker, 1908: 75.

*Trichocladius proximus* Kieffer, 1911: 186.

*Trichocladius nudipes* Goetghebuer, 1921: 100.

*Trichocladius dentifer* Goetghebuer, 1935: 7.

*Trichocladius nadigi* Goetghebuer, 1938: 62.

*Trichocladius rufipes* Goetghebuer, 1944: 39.

*Trichocladius arduus* Goetghebuer in Humphries, 1951: 209.

*Paratrichocladius luteoligaster* Santos-Abreu, 1918: 205.

*Phaenocladius bavaricus* Kieffer, 1924a: 82.

*Trichocladius hyemalis* Goetghebuer, 1950: 9.

*Paratrichocladius rufiventris* Hirvenoja, 1973: 88; Cranston & Oliver, 1988: 444; Rossaro, 1990: 58; Wang & Zheng ,1990: 245; Wang, 2000: 638; Yamamoto, 2004: 73; Fu *et al*., 2012: 467.

Distribution. Palaearctic China (Ningxia Autonomous Region, Nei Monggol Autonomous Region, Xinjiang Autonomous Region, Jilin, Liaoning, Hebei, Shandong, Gansu); Oriental China (Yunnan, Fujian, Sichuan, Guizhou).

12. *Paratrichocladius sagittarius* Fu *et al*., 2012

*Paratrichocladius sagittarius* Fu *et al*., 2012: 469.

Distribution. Oriental China (Sichuan).

13. *Paratrichocladius skirwithensis* (Edwards, 1929)

*Spaniotoma skirwithensis* Edwards, 1929: 329.

*Trichocladius clavatus* Kieffer, 1924b: 91.

*Paratrichocladius skirwithensis* (Edwards) Pinder, 1978; Cranston & Oliver, 1988: 444; Rossaro, 1990: 61; Fu *et al*., 2012: 471.

Distribution. Palaearctic China (Jilin, Ningxia Autonomous Region, Xinjiang Autonomous Region); Oriental China (Tibet Autonomous Region, Shaanxi (Ankang County), Sichuan).

14. *Paratrichocladius ternarius* Fu *et al*., 2012

*Paratrichocladius ternarius* Fu *et al.*, 2012: 472.

Distribution. Oriental China (Sichuan).

15. *Paratrichocladius tridens* Fu & Wang, 2008

*Paratrichocladius tridens* Fu et Wang, 2008: 728; Fu *et al*., 2012: 474.

Distribution. Oriental China (Tibet Autonomous Region).

16. ***Paratrichocladius yakukeleus* Sasa et Suzuki, 2000** (Fig. 2), new record to China

*Paratrichocladius yakukeleus* Sasa et Suzuki, 2000: 68; Yamamoto, 2004: 75.

**Speciemens examined.** 3♂ (HBMY No. 1001, 1002, 1003), **China**, Yunnan, Kunming, Haigeng Wet Land Park, 28-X-2013, leg. Yue FU.

Diagnostic characters. This species can be separated from other members in the genus by having more than 30 dorsocentrals, AR about 1.0, superior volsella developed and broad, and inferior volsella bilobed, extended and with rounded apex and a small secondary lobe.

The male imago ($n$ = 3)

Total length 3.0–3.3, 3.2 mm. Wing length 1.5–1.6, 1.55 mm. Total length/ wing length 2.0. Wing length/ length of profemur 2.2–2.4, 2.3.

Coloration. Head dark brown, antenna and palpomere brown. Thorax dark brown. Abdomen yellow. Legs yellow brown.

Head. Ultimate flagellomere 490–510 μm long. AR: 1.14–1.26. Temporal setae 4, including 2 inner vertical, 2 outer vertical. Clypeus with 16–120, 18 setae. Tentorium 123–135, 130 μm long, 35–42, 40 μm wide. Stipes: 135–140, 138 μm long, 10–12, 11 μm wide. Palpomere lengths (in μm): 35–40, 38; 40–50, 45; 108–113, 110; 113–118, 115; 185–198, 190. Palpomere 5/ 3: 1.7–1.9, 1.8.

Thorax. Dorsocentrals 30–33, 32 setae, prealars 2. Scutellum with 8–10 setae.

Wing (Fig. 2A). Squama with 4–6, 5 fringe hairs. R with 4–5, 4 setae. Costa extension 16–20, 18 μm long. VR 1.0–1.1. Cu length 640–670, 660 μm. Cu/wing length 0.42–0.43. Wing width/wing length 0.32– 0.33.

Leg. Spur of front tibia 42–45, 43 µm long, spurs of middle tibia 18–23, 20 µm and 10–15, 13 µm long, of hind tibia 55–58, 56 µm and 20–25, 22 µm long. Width at apex of fore tibia 45–55, 50 µm, of mid tibia 50–55, 52 µm, of hind tibia 55–65, 60 µm. Tip of hind tibia comb of 12–14, 13 setae. Lengths and proportions of legs as in Table 1:

**Table 1. Lengths (in µm) and proportion of legs segments in male *P. yakukeleus* Sasa & Suzuki** (*n* = 3)

| | $P_1$ | $P_2$ | $P_3$ |
|---|---|---|---|
| fe | 620–653, 633 | 721–770, 746 | 643–672, 653 |
| ti | 620–653, 633 | 742–761, 755 | 772–781, 778 |
| $ta_1$ | 545–574, 560 | 355–374, 365 | 455–465, 460 |
| $ta_2$ | 327–330, 328 | 234–254, 245 | 244–258, 251 |
| $ta_3$ | 253–256, 255 | 168–174, 170 | 208–227, 213 |
| $ta_4$ | 160–184, 170 | 120–126, 124 | 120–126, 124 |
| $ta_5$ | 105–115, 1105 | 100–121, 110 | 107–118, 113 |
| LR | 0.64–0.66, 0.65 | 0.45–0.48, 0.46 | 0.56–0.59, 0.58 |
| BV | 2.7–2.9, 2.8 | 4.0–5.0, 4.5 | 3.1–3.4, 3.2 |
| SV | 2.4–2.6, 2.5 | 3.1–3.3, 3.2 | 2.7–3.0, 2.8 |
| BR | 1.3–1.5, 1.4 | 1.5–1.7, 1.6 | 1.7–2.0, 1.8 |

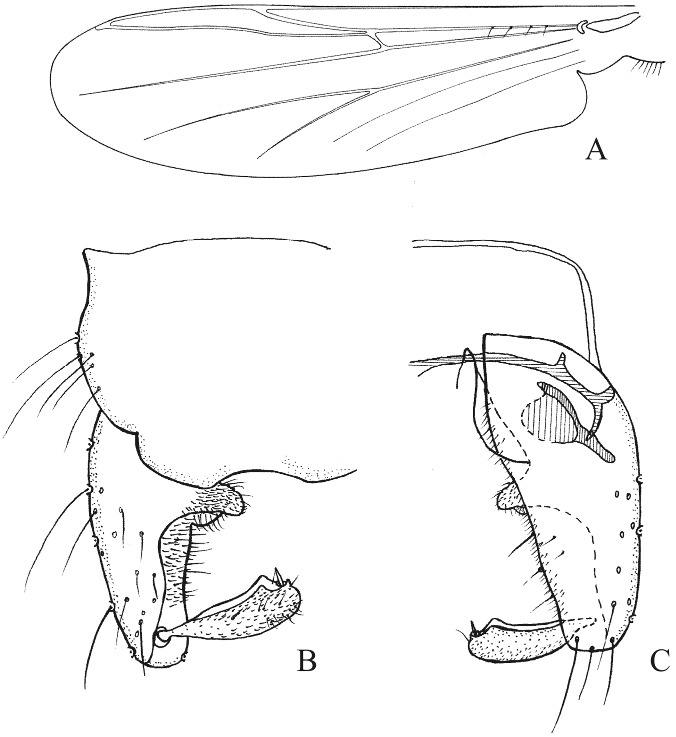

Figure 2. *P. yakukeleus* Sasa & Suzuki, male imago. A. Wing; B. Hypopygium, dorsal view; C. Hypopygium, ventral view.

Hypopygium (Figs. 2B, C). Laterosternite IX with 5–6 long setae. Phallapodeme 60–70, 65 μm long, transverse sternapodeme 100–105, 102 μm long, with small oral projections. Gonocoxite 188–190, 189 μm long. Inferior volsella bilobed. Superior volsella developed and rounded. Gonostylus 80–90, 85 μm long, with small triangular crista dorsalis. Megaseta 10–12 μm long. HR 2.1–2.2, HV 3.7–3.8.

Distribution. This species is recorded from Japan (Palaearctic Region), and Oriental China.

Remarks. Sasa & Suzuki (2000) established this species based on specimens from Japan. When we examined the specimens from Yunnan Provience, we found that most measurements of the Chinese specimens are within the same range as the holotype. However, the Chinese specimens have an AR of 1.14–1.26 while the Japanese holotype has an AR of 0.86–0.91; all abdominal tergites yellow while tergites I, IV and V yellow, others brown in the holotype.

## Key to males of the genus *Paratrichocladius* in China

1. Inferior volsella bilobed ·········· 2
-. Inferior volsella single-lobed ·········· 6
2. Abdominal tergites II–III, VI–VIII dark brown, other tergites yellowish; humeral pit absent; gonostylus slender, with very small crista dorsalis ·········· *P. bicinctus* Fu *et al.*
-. Abdominal tergites in the same color, humeral pit present; gonostylus with distinct crista dorsalis ·········· 3
3. Scutellum with 26–30, 28 setae; setae on anterior margin of tergite V–VI clearly reduced; inferior volsella boxing glove shaped ·········· *P. caestus* Fu *et al.*
-. Scutellum with less than 20 setae; setae on anterior margin of tergite V–VI not reduced; inferior volsella not boxing glove shaped ·········· 4
4. Femur of middle and hind legs dark brown in apical 1/3, other parts yellow; humeral pit reniform; palpomere 5th/3rd higher than 3.0; setae on tergites very short, posterior of tergites V–VII in pale coloration ·········· *P. tridens* Fu et Wang
-. Legs unicolored, humeral pit not reniform; palpomere 5/3 lower than 2.0; setae on tergites long, posterior of tergites V–VII not in pale coloration ·········· 5
5. AR about 1.0; dorsocentrals 33, and multiserial; superior volsella rounded and well developed, gonostylus with small triangular crista dorsalis ·········· *P. yakukeleus* Sasa et Suzuki
-. AR 1.6–2.0, 1.8; dorsocentrals 12–26, and uniserial; superior volsella not developed; gonostylus with rounded crista dorsalis ·········· *P. ater* Wang et Zheng
6. Palp with only 3 palpomeres ·········· *P. ternarius* Fu *et al.*
-. Palp with 5 palpomeres ·········· 7
7. Apex of inferior volsella rounded, AR nearly 3.0 ·········· *P. comptus* Fu *et al.*
-. Apex of inferior volsella not rounded, AR lower than 2.0 ·········· 8
8. Apex of inferior volsella hook-shaped ·········· 9
-. Apex of inferior volsella not hook-shaped ·········· 10
9. Inferior volsella basally narrowed, protruding in medial direction, strongly hooked medially; gonostylus slightly expanded on basal 1/4, with nearly rounded crista dorsalis ·········· *P. aduncus* Fu *et al.*
-. Inferior volsella basally broad, not protruding in medial direction, apically hooked; gonostylus not expanded on basal 1/4, with small triangular crista dorsalis ·········· *P. hamatus* Wang et Zheng
10. Inferior volsella strongly downwards curved ·········· 11
-. Inferior volsella straight or slightly curved ·········· 12
11. Inferior volsella apical pointed, digitiform ·········· *P. guidalii* Rossaro
-. Inferior volsella unartificially folded near medial apex ·········· *P. pierfrancescoi* Rossaro
12. Inferior volsella wide and rectangular, anterior and posterior margins parallel ·········· *P. lanzavechiai* Rossaro

-. Inferior volsella narrow and more or less triangular or sagittiform, anterior and posterior margins not parallel ······ 13

13. Inferior volsella arrow-shaped, pointing downwards; gonostylus with pointed triangular crista dorsalis ······ *P. sagittarius* Fu *et al.*

-. Inferior volsella nearly triangular, pointing medially, gonostylus with triangular or slightly rounded crista dorsalis ······ 14

14. AR 0.62, row of basal setae of abdominal tergites absent ······ *P. brevicornis* Hirvenoja

-. AR > 0.77, row of basal setae of abdominal tergites present ······ 15

15. AR usually less than 1.0; humeral pit scarcely present, inferior volsella higher, and not distinctly mediad extended ······ *P. skirwithensis* (Edwards)

-. AR usually more than 1.0; humeral pit strongly developed, inferior volsella lower, and distinctly extended mediad ······ 16

16. Inferior volsella posteriorly relatively hooked, with notched margin ······ *P. pretorianus* (Freeman)

-. Inferior volsella posteriorly relatively straight, with flat margin ······ *P. rufiventris* (Meigen)

## Acknowledgments

This project was supported by the National Natural Science Foundation of China (NSFC) (31101624, 31272284, 31201739, J1210005), the Fourth Open Foundation of Key Laboratory of Biological Resources Protection and Utilization of Hubei Province (PKLHB1305, PKLHB1326), the First Level Disciplines of Forestry, the Natural Science Foundation of Education Bureau of Hubei Province, China (Q20111904) and the Scientific Research Starting Foundation for Doctorates, Hubei Minzu University (MY2010B010).

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